Alternative Fuel School Buses: A View for School Boards

Outline of Presentation

- What Are Alternative Fuels?
- Are They Safe?
- Why Do We Need Alternative Fuels?
- Opportunity for Leadership
- Alternative Fuel School Buses at Work Across America
- What Is Available in Alternative Fuel School Buses?
- What are the Benefits and Costs of Alternative Fuel Use?
- For More Information

What Are Alternative Fuels?

- "Alternative Fuel" refers to vehicle fuels other than gasoline or diesel. For example,
  - Natural Gas
  - Propane
  - Ethanol
  - Biodiesel
  - Electricity
  - Hydrogen

Are Alternative Fuel School Buses Safe?

- School buses are one of the safest modes of transportation on the highway: alternative fuels don't significantly impact this safety
- No known school bus fatalities have resulted from an alternative fuel system
- Alternative fuel school buses meet all conventional bus safety standards plus additional safety standards for alternative fuels (tank safety cages, etc.)

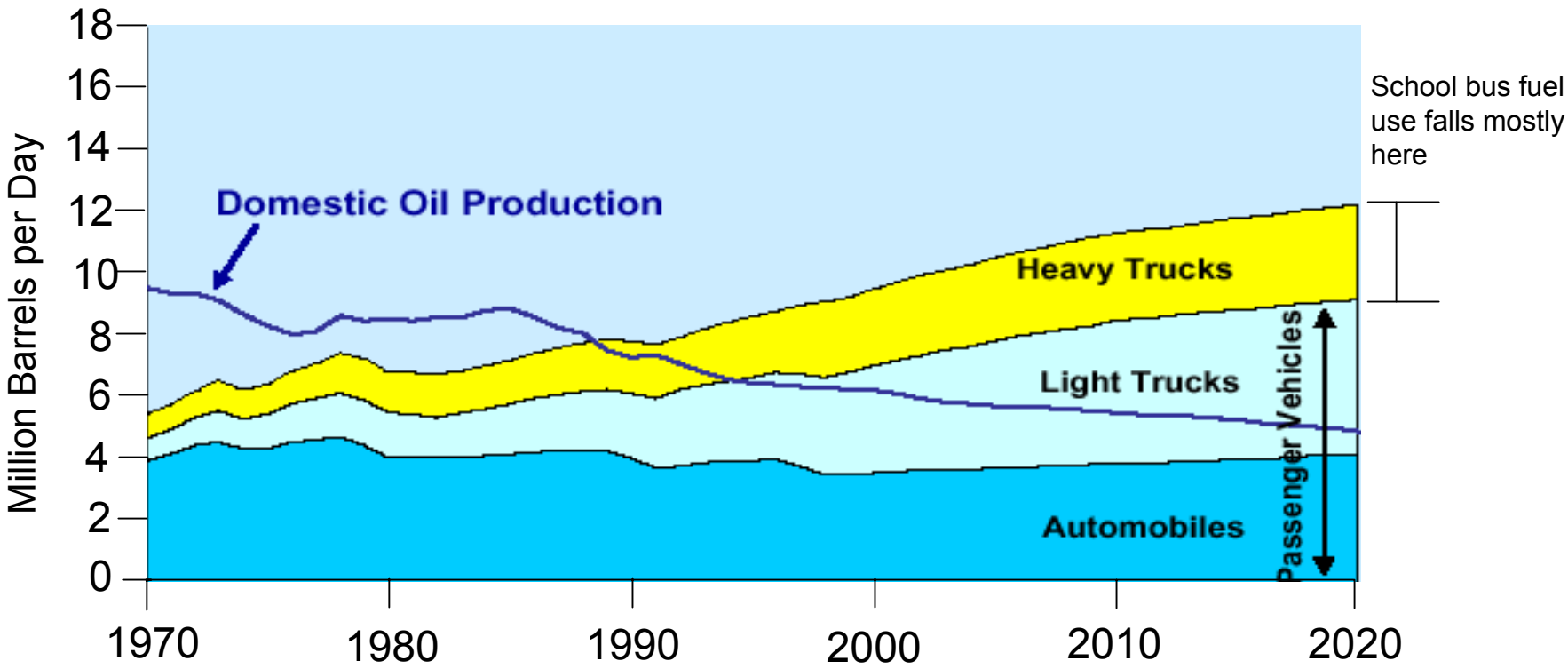
Why Do We Need Alternative Fuels?

- Enhance health conditions for students and neighborhoods through reduced exhaust emissions
  - Many regions of the U.S. are facing significant air quality attainment issues as populations grow
  - Alternative fuel vehicles usually have better emissions performance than equivalent conventional fuel vehicles
  - School buses very visible in the community, and cleaner is better
  - According to the Natural Resources Defense Council, riders inside a diesel bus can be exposed to as much as 4 times the exhaust toxics as someone outside the bus: alternative fuels can reduce these emissions

Why Do We Need Alternative Fuels?

- Reduce American Use of Petroleum Fuels
  - Over half of U.S. transportation petroleum use is imported
  - In some states, imported petroleum use for transportation is as high as 85%
  - The current political climate can create significant price spikes for petroleum fuels, which could affect operations of school bus fleets, with potential interruptions in service

U.S. Highway Transportation Uses More Oil Than is Produced Domestically



Source: Transportation Energy Data Book: Edition 18; DOE/ORNL-6941, September 1998, and EIA Annual Energy Outlook 1999, DOE/EIA-0383(99), December 1998

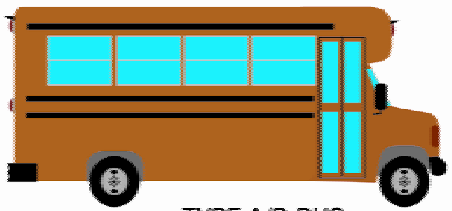
Opportunity for Leadership

- Alternative fuel buses offer a chance for the school system to be an environmental leader in the community
- These vehicles also offer public relations benefits to the schools
  - Very visible vehicles in the community
  - Cleaner vehicles (lower exhaust emissions)
  - Quieter vehicles
- The vehicles can be tied to an environmental and energy curriculum for students in the school
- Buses acclimate students to alternative fuels to enable future acceptance of AFVs by current generations of students
- Provide visible opportunities to partner with other organizations and jurisdictions within the community or metropolitan area to achieve common goals

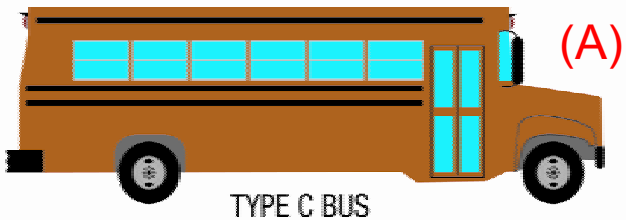
Alternative Fuel Buses Are at Work Throughout America

- Currently over 2,500 alternative fuel school buses in U.S.
  - 21 states across the U.S. in a wide range of applications and climates
  - Natural gas, propane, biodiesel
  - Displacing 4-5 million gallons of petroleum each year

Types of School Buses

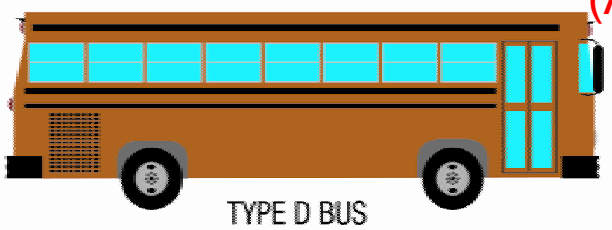


Small cutaway on van-type chassis, up to 12,000 lb GVW (Type A) or 14,500 lb (Type B)



(A)

Conventional bus on medium-duty truck chassis, up to 31,000 lb GVW



(A)

Transit-style bus on medium-duty truck chassis, up to 36,000 lb GVW

(A) = Alternative Fuel Option Available

Available Products

- Several products available
  - Type D (transit-style school bus)
  - DOE is working with manufacturers to develop a Type C natural gas bus
- Mostly natural gas vehicles
- A new Type C propane school bus platform is now available for 2004
- No specific biodiesel products: biodiesel blends (up to 20% biodiesel and 80% regular diesel) can be used in most diesel engines

Benefits and Costs of Using Alternative Fuels

- Natural Gas Buses
  - Fuel can be as much as 40 cents per gallon equivalent cheaper; local prices vary
  - Some school systems are saving between 12 and 20 cents per mile with natural gas buses
  - Maintenance costs are usually lower than for diesel
  - Possible significant emission reductions relative to current diesel engines (especially particulates and NOx)
  - Many operators comment on quieter operation of natural gas buses
  - Many areas already have natural gas refueling in place; school system can cooperate with other districts and local governments to share refueling sites
  - Buses cost ~$30,000 more than conventional buses
  - Refueling infrastructure costly (starting around $250,000); price highly dependent on speed and volume refueling requirements

Benefits and Costs of Using Alternative Fuels (cont.)

- Biodiesel Blends
  - Can be used with existing vehicles: no vehicle incremental costs
  - Can use existing diesel refueling infrastructure
  - Fuel widely available
  - Fuel can cost 10-20 cents more per gallon (if used in 20% blend with regular diesel)
  - Some increased maintenance (fuel filters), especially during first months of use
  - Significant particulate matter emission reductions from diesel engines
- Propane
  - Fuel cost dependent on area suppliers (can be more or less than diesel)
  - Vehicle cost ~$30,000 more (estimated): most propane buses are conversions of Type C buses
  - Refueling infrastructure not as expensive as natural gas, and many areas already have propane refueling available
  - Maintenance costs lower than for diesel (e.g. increased oil change intervals
  - Notable emission reductions relative to current diesel engines
  - Savings of as much as $1,335 per vehicle per year have been seen by propane bus fleets

Funding Sources for Alternative Fuel Vehicle Projects

- DOE Clean Cities State Energy Program Special Projects
  - Can fund incremental cost of vehicles and cost of refueling stations
  - Work with local Clean Cities Program to submit grant requests for projects
  - SEP is a competitive solicitation offered yearly
  - SEP School Bus Application Template available at http://www.ccities.doe.gov/pdfs/bustutor.pdf
- Congestion Mitigation and Air Quality (CMAQ) funding
  - Available through local planning organizations, administered by state DOT
  - Availability for alternative fuel projects varies by state
- State funds
- Local government funds
- Foundation funds
- Partnering with fuel providers to offset infrastructure costs or to reduce maintenance and operational costs or fuel costs

In Summary

- Proven Technology in Use throughout U.S.
- Reduce Local Dependence on Imported Petroleum
- Schools are a "Better Neighbor"
  - Lower emissions (visible and odor): important for areas of operation and for student health
  - Buses can be significantly quieter
- Potential for Overall Cost Savings
- Funds Available to Offset Some Costs

For More Information

- National Clean Cities Program
  - http://www.ccities.doe.gov
- Natural Gas Vehicle Coalition
  - http://www.ngvc.org
- Propane Vehicle Council
  - http://www.propanevehicle.org
- National Biodiesel Board
  - http://www.nbb.org
- National Alternative Fuels Training Consortium
  - http://naftp.nrcce.wvu.edu
- "Alternative Fuel School Buses Earn High Marks", Alternative Fuel News Volume 5 Number 3
  - http://www.ccities.doe.gov